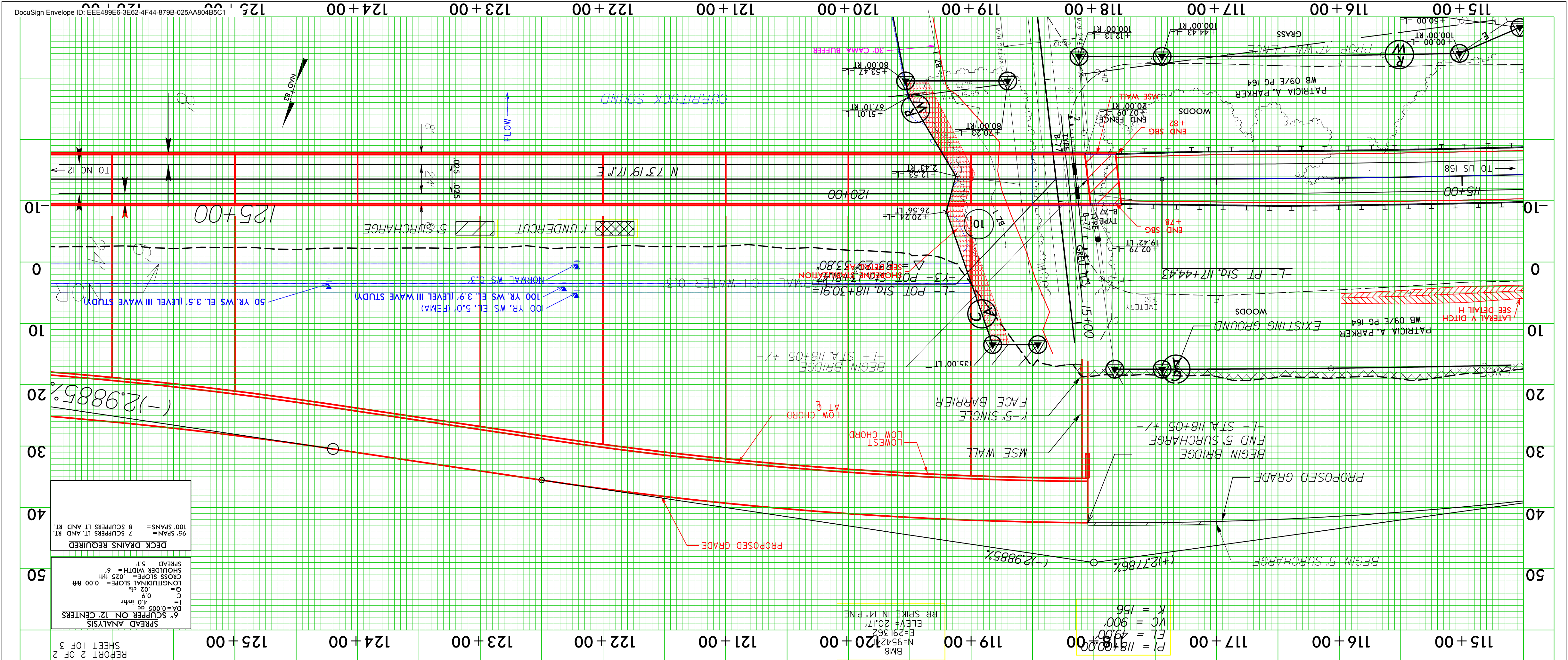


ATTACHMENT G

*Bridge Survey & Hydraulic Design Report
August 2023*



SPREAD ANALYSIS
6" SCUPPER ON 12" CENTERS
DA = 0.005
C = 4.0
G = 0.9
CONCRETE SLOPE = 0.00 4th
CROSS SLOPE = 0.025 4th
SHOULDER WIDTH = 6'
SPREAD = 5.1'

DECK DRAINS REQUIRED
95 SPANS = 7 SCUPPERS LT AND RT.
100 SPANS = 8 SCUPPERS LT AND RT.

INFORMATION TO BE SHOWN ON PLANS

Elevations Provided by the Wave Study (Provided by Hydraulics Unit)

Design:	Discharge	N/A	c.f.s.	Frequency	50 yr.	yr.	Elev.	3.5	ft.
Base Flood:	Discharge	N/A	c.f.s.	Frequency	100	yr.	Elev.	3.9	ft.
Overtopping:	Discharge	N/A	c.f.s.	Frequency	500+	yr.	Elev.	13.68	ft.

50 yr. WS EL. 3.5' (LEVEL III WAVE STUDY)
100 yr. WS EL. 3.9' (LEVEL III WAVE STUDY)
500 yr. WS EL. 13.68' (FEMA)

ADDITIONAL INFORMATION AND COMPUTATIONS

SCOUR CALCULATIONS PROVIDED BY Moffatt & Nichol

LOCATION	TOTAL SCOUR (FEET)		FLOW VELOCITIES (FT/SEC)	
	100 yr.	500 yr.	100yr.	500yr.
SECTION 1 STA. 119-169	10.1	11.2	6.0	7.5
SECTION 2 STA. 170-173	13.4	14.3	7.5	8.5
SECTION 3 STA. 174-248	11.0	11.7	7.5	8.5
SECTION 4 STA. 249-363	8.2	9.1	4.0	5.0
SECTION 5 EAST 2 BENTS	9.3	10.4	4.0	5.0

LEVEL III WAVE STUDY DATA FOR COASTAL BRIDGE
BRIDGE " (NEW) MID-CURRITUCK COUNTY CURRITUCK

LOCATION (AT THALWEG) LAT 36.34248 LONG -75.86605
CONVERSION FOR MSL TO NAVD DELTA SUBTRACT 0.32 FT

HYDRAULIC DATA

	UNITS	100 YR	50 YR	10 YR
DEPTH-AVE. CURRENT SPEED	FT/SEC	3.8	3.2	2.2
WIND SPEED	MI/HR	4.2	3.9	2.8
WATER SURFACE ELEVATION	FT MSL	4.2	3.9	2.8
	FT NAVD	3.9	3.5	2.5
WAVE CREST ELEVATION	FT MSL	8.1	7.3	5.0
	FT NAVD	7.7	7.0	4.7
SIGNIFICANT WAVE HEIGHT	FT	3.4	3.2	2.5

The nearest benchmark is up Albemarle Sound at Frog Island and it states:
This station has been determined to be Non-tidal for tidal datum purposes. There is either no measurable periodic rise and fall of the tide at this location, or it may be present but inconsistent, or the periodic tide is present and consistent, however the Mean Range of Tide (MRT) is negligible, that is below the established tidal/non-tidal threshold of 0.03m (0.09ft). Only the datum of local Mean Sea Level (MSL) is published at these stations. For Nautical Charting Datum applications, a non-tidal Low Water Datum (LWD) is established as 0.50ft (0.15m) below MSL.

SITE DATA

Drainage Area N/A (INDETERMINATE - SOUND) Source N/A
River Basin PASQUOTANK Character RURAL COASTAL PLAINS
Stream Classification (Such as Trout, High Quality Water, etc.) SC
Data on Existing Structure N/A (NEW LOCATION)
Total Waterway Opening N/A s.f.
Waterway Opening Below 100yr. WS EL. N/A s.f.
Debris Potential: Low Moderate High
Data on Structures Up and Down Stream N/A

Design Control Elev. N/A ft.
Gage Station No. N/A Period of Records N/A yrs.
Max. Discharge N/A c.f.s. Date N/A Frequency N/A

Historical Flood Information:

Date	Elev.	ft.	Est. Freq.	yr.	Source	Period of Knowledge	yrs.
Date	Elev.	ft.	Est. Freq.	yr.	Source	Period of Knowledge	yrs.
Date	Elev.	ft.	Est. Freq.	yr.	Source	Period of Knowledge	yrs.

Historical Scour Info. : General ft. Contraction ft. Local ft.
Channel Slope N/A ft/ft Source N/A Normal Water Surface Elev. 0.3 ft.
Manning's n: Left O.B. Channel Right O.B. Source
Flood Study /Status FEMA ZONE AE (EL 5) COASTAL STORM SURGE Floodway Established? N/A
Flood Study 100yr. Discharge N/A c.f.s. WS Elev.: Floodway Without N/A ft. Floodway With N/A ft. @ River Station ?

DESIGN DATA

Hydrological Method LEVEL III WAVE STUDY DATA FOR COASTAL BRIDGE
Hydraulic Design Method LEVEL III WAVE STUDY DATA FOR COASTAL BRIDGE

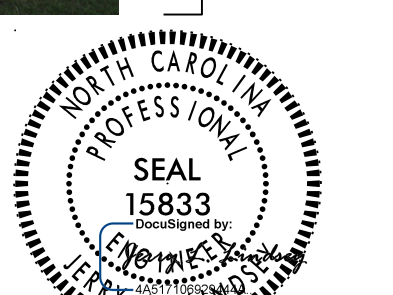
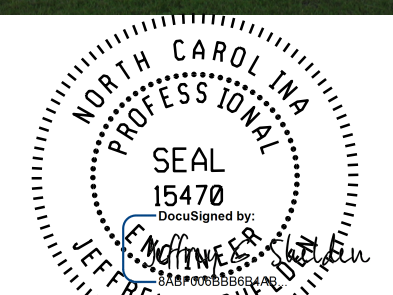
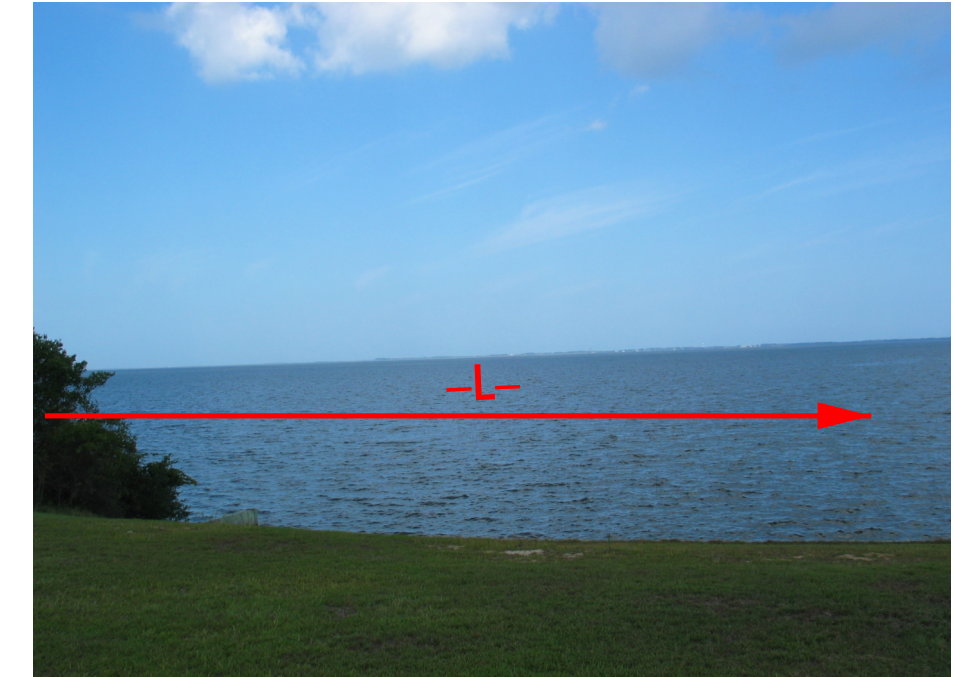
Floods Evaluated:	Freq. (yr.)	Q (c.f.s.)	Elev. (ft.)	Backwater (ft.)	Bridge Opening Velocity (f.p.s.)
@ River Station ?	10	N/A	2.5	N/A	N/A
	50	N/A	3.5	N/A	N/A
	100	N/A	3.9	N/A	N/A
	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A

Waterway Opening Provided Below Design W.S. Elev. 54,335 s.f., 100yr W.S. Elev. 68,123 s.f., 2,968,376 s.f., Total
Average Channel Velocity (Design) 3.2 f.p.s. Average Overbank Velocity (Design) NA f.p.s.
Computed Scour : General SEE BACK COVER ft. Contraction SEE BACK COVER ft. Local SEE BACK COVER ft.
Is a Floodway Revision Required? NO

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

N. C. DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, N. C.

I.D. No. R-2576 Project No. 34470.I.TAI Proj. Station 241+37.5 -L-
County CURRITUCK Bridge Over CURRITUCK SOUND Bridge Inv. No.
On Highway Between US 158 and NC 12
Recommended Structure 1 @ 95' 72" MBT, 244 @ 100' 72" MBT, 2 @ 85' 54" MBT
4' 0" END BENT CAPS West End: Vertical Abutment w/ MSE wall; East End: Sloping Abutment
Recommended Width of Roadway 40' TO 64' CLEAR ROADWAY Skew 90°
Recommended Location is (Up, At, Down) Stream from Existing Crossing NEW LOCATION
Latitude 36.34248 Longitude -75.86605
Statewide Tier Regional Tier Sub-Regional Tier
Bench Mark is BM 8 RR SPIKE IN 14' PINE LOCATED 422' RIGHT OF STATION 119+10 -L-
N954241, E291362 Elev. 20.17 ft. Datum: NAVD 88
Temporary Crossing NOT REQUIRED (NEW LOCATION)



Designed by: M.S. PRICE, P.E.
Assisted by:
Project Engineer: J. L. LINDSEY, P.E.
Reviewed by: Ray D. Livingood 08/22/2023
MODELING AND SCOUR COMPS DRAFT & DECK DRAINAGE ONLY

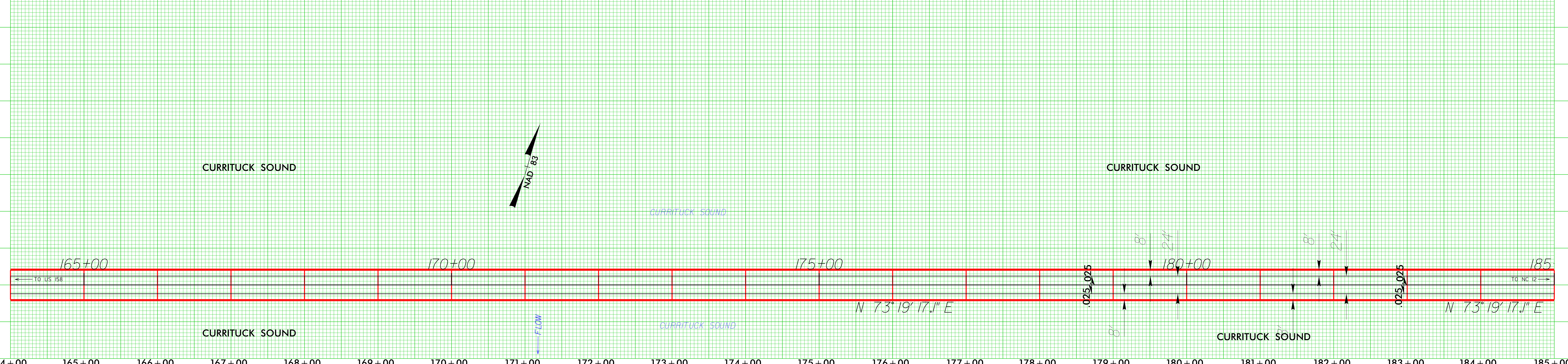
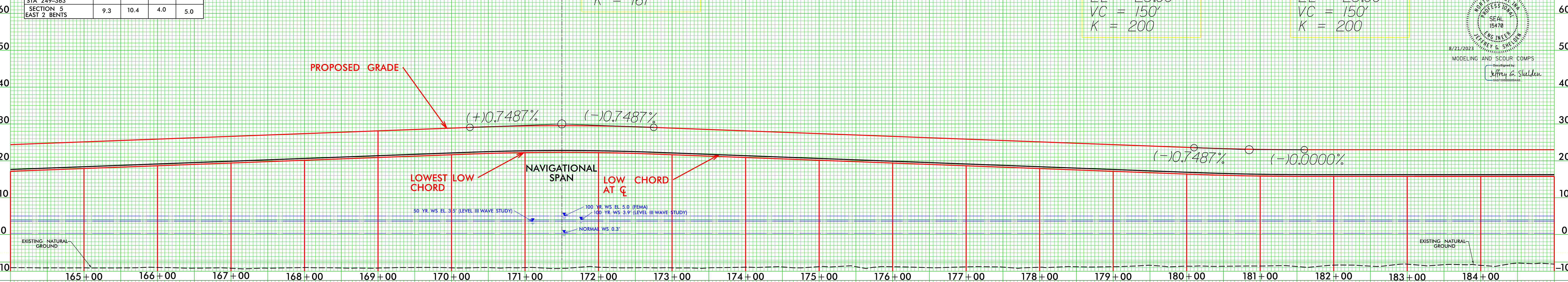
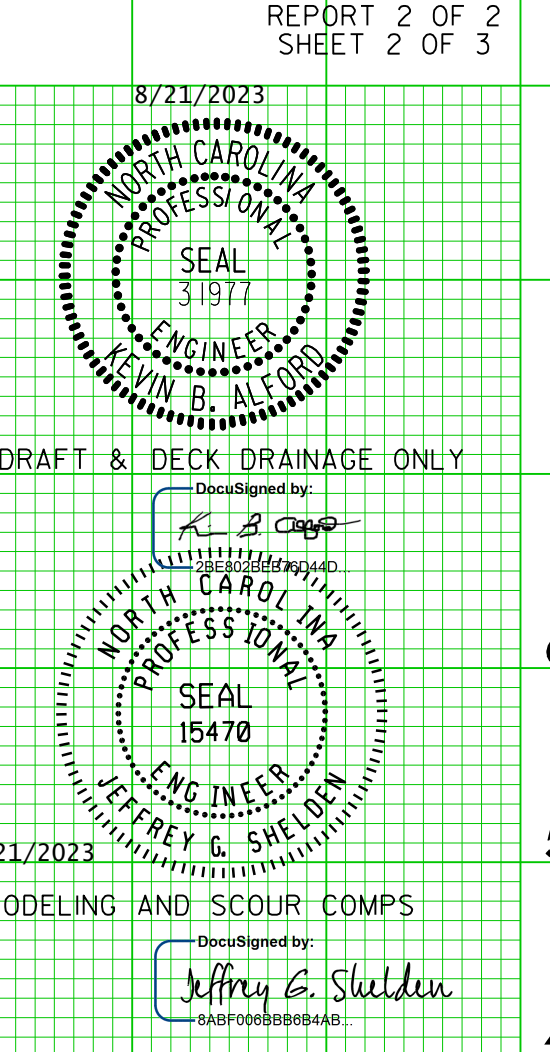
SCOUR CALCULATIONS PROVIDED BY Moffat & Nichol

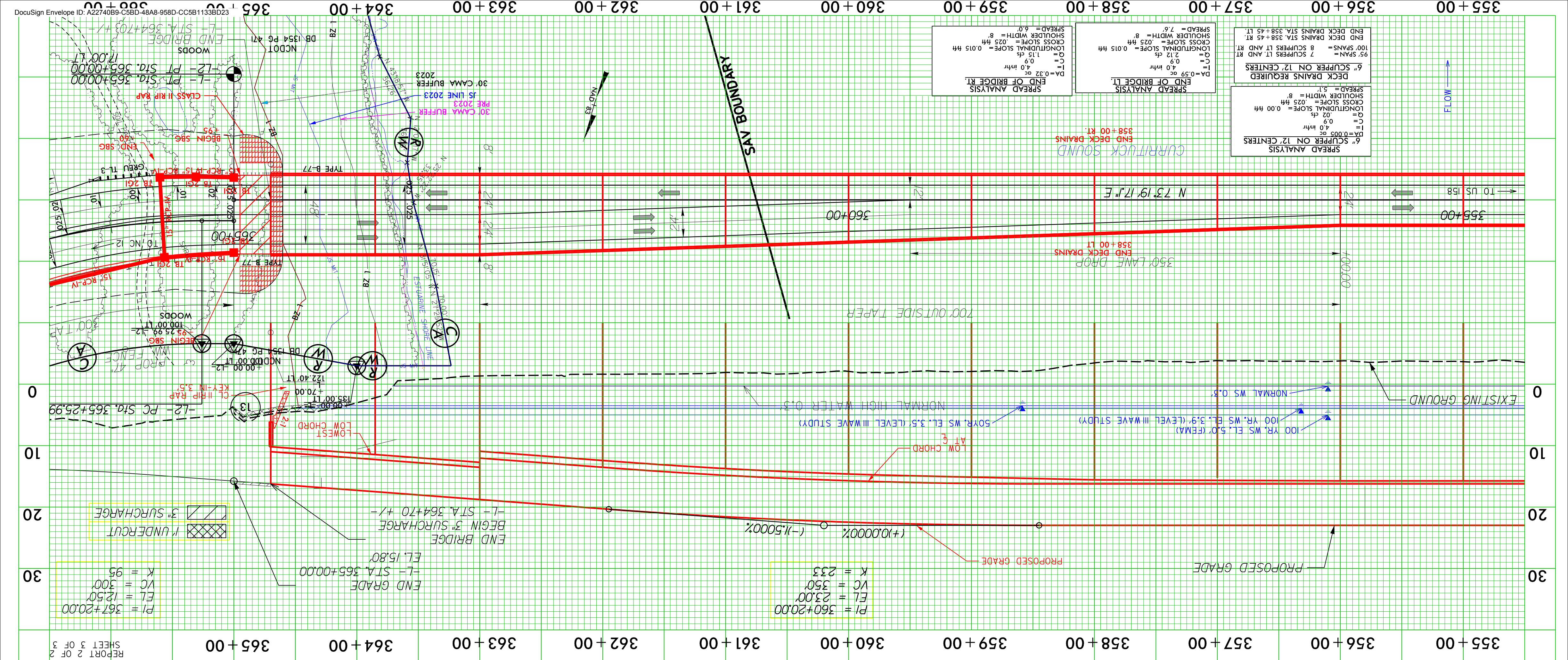
LOCATION	TOTAL SCOUR (FEET)		FLOW VELOCITIES (FT/SEC)	
	100 yr.	500 yr.	100yr.	500yr.
SECTION 1 STA 119-169	10.1	11.2	6.0	7.5
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SECTION 5 EAST 2 BENTS	9.3	10.4	4.0	5.0

PI = 171+50.00
EL = 30.00'
VC = 250'
K = 167

PI = 180+85.00
EL = 23.00'
VC = 150'
K = 200

PI = 180+85.00
EL = 23.00'
VC = 150'
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INFORMATION TO BE SHOWN ON PLANS

Elevations Provided by the Wave Study (Provided by Hydraulics Unit)

Design:	Discharge	N/A	c.f.s.	Frequency	50 yr.	yr.	Elev.	3.5	ft.
Base Flood:	Discharge	N/A	c.f.s.	Frequency	100 yr.	yr.	Elev.	3.9	ft.
Overtopping:	Discharge	N/A	c.f.s.	Frequency	500+	yr.	Elev.	13.68	ft.
							Seg Sta	367+12.94	L2

ADDITIONAL INFORMATION AND COMPUTATIONS

SCOUR CALCULATIONS PROVIDED BY Moffatt & Nichol

LOCATION	TOTAL SCOUR (FEET)		FLOW VELOCITIES (FT/SEC)	
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LEVEL III WAVE STUDY DATA FOR COASTAL BRIDGE
BRIDGE # (NEW) MID-CURRITUCK
COUNTY CURRITUCK

LOCATION (AT THALWEG) CONVERSION FOR
LAT 36.34248 MSL TO NAVD DELTA
LONG -75.86605 SUBTRACT 0.32 FT

HYDRAULIC DATA	UNITS	100 YR	50 YR	10 YR
DEPTH-AVE. CURRENT SPEED	FT/SEC	3.8	3.2	2.2
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SITE DATA

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River Basin PASQUOTANK Character RURAL COASTAL PLAINS
Stream Classification (Such as Trout, High Quality Water, etc.) SC
Data on Existing Structure N/A (NEW LOCATION)
Debris Potential: Low Moderate High
Data on Structures Up and Down Stream N/A

Design Control Elev. N/A ft.
Gage Station No. N/A Period of Records N/A yrs.
Max. Discharge N/A c.f.s. Date N/A Frequency N/A

Historical Flood Information:
Date Elev. ft. Est. Freq. yr. Source Period of Knowledge yrs.
Date Elev. ft. Est. Freq. yr. Source Period of Knowledge yrs.
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Flood Study 100yr. Discharge N/A c.f.s. WS Elev.: Floodway N/A ft. Floodway N/A ft.
@ River Station ?

DESIGN DATA

Hydrological Method LEVEL III WAVE STUDY DATA FOR COASTAL BRIDGE
Hydraulic Design Method LEVEL III WAVE STUDY DATA FOR COASTAL BRIDGE
Floods Evaluated: Freq. Q (c.f.s) Elev. Backwater Bridge Opening Velocity
@ River Station ? 10 N/A 2.5 N/A N/A
50 N/A 3.5 N/A N/A
100 N/A 3.9 N/A N/A
N/A N/A N/A N/A N/A
N/A N/A N/A N/A N/A
Waterway Opening Provided Below Design W.S. Elev. 54,335 s.f., 100yr W.S. Elev. 68,123 2,968,376 s.f., Total s.f.
Average Channel Velocity (Design) 3.2 f.p.s. Average Overbank Velocity (Design) NA f.p.s.
Computed Scour: General SEE BACK COVER
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4' 0" END BENT CAPS, West End Vertical Abutment w/ MSE wall, East End Sloping Abutment
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N954241, E291362 Elev. 20.17 ft. Datum: NAVD 88
Temporary Crossing NOT REQUIRED (NEW LOCATION)



CURRITUCK SOUND Stream Inv. No. R-2576, Project No. 34470.I.TAI PDF File R-2576-Currtruck Sound.3 of 3.pdf

Designed by: M.S. PRICE, P.E.
Assisted by:
Project Engineer: J. L. LINDSEY, P.E.
Reviewed by: Roy D. Lovingsgood 08/22/2023 JEFFREY G. SHELDON 8/21/2023
MODELING AND SCOUR COMPS DRAFT & DECK DRAINAGE ONLY